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(54) SYSTEM AND METHOD FOR MODIFYING A DOCUMENT FORMAT

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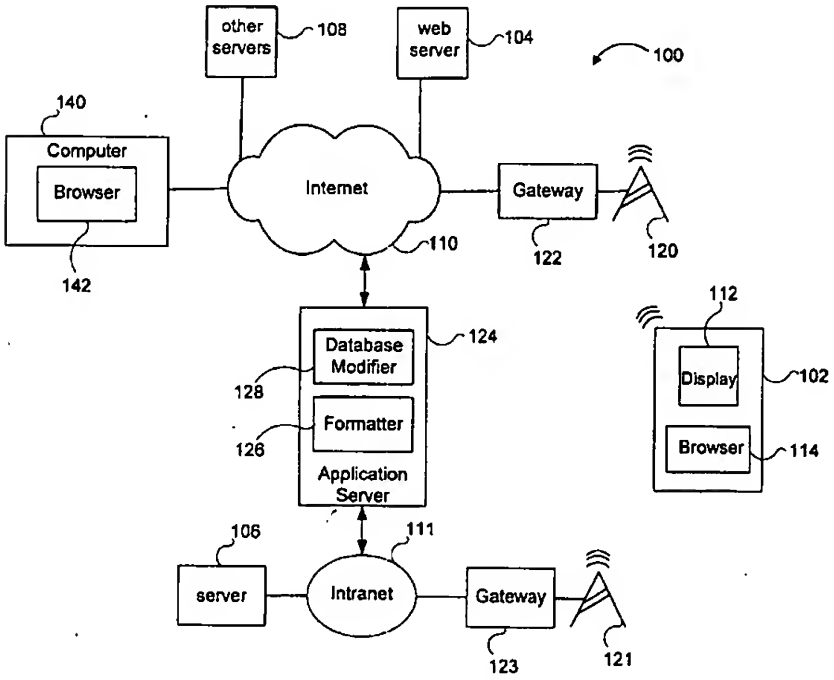
(57) ABSTRACT

A system and method are disclosed for modifying a document format. In one embodiment, a structure of a first document is extracted to form a first data structure. The first data structure is then modified to form a second data structure. Content from a second document is extracted from the second document and inserted into the second data structure to permit display of the content of the second document in the format of the second data structure.



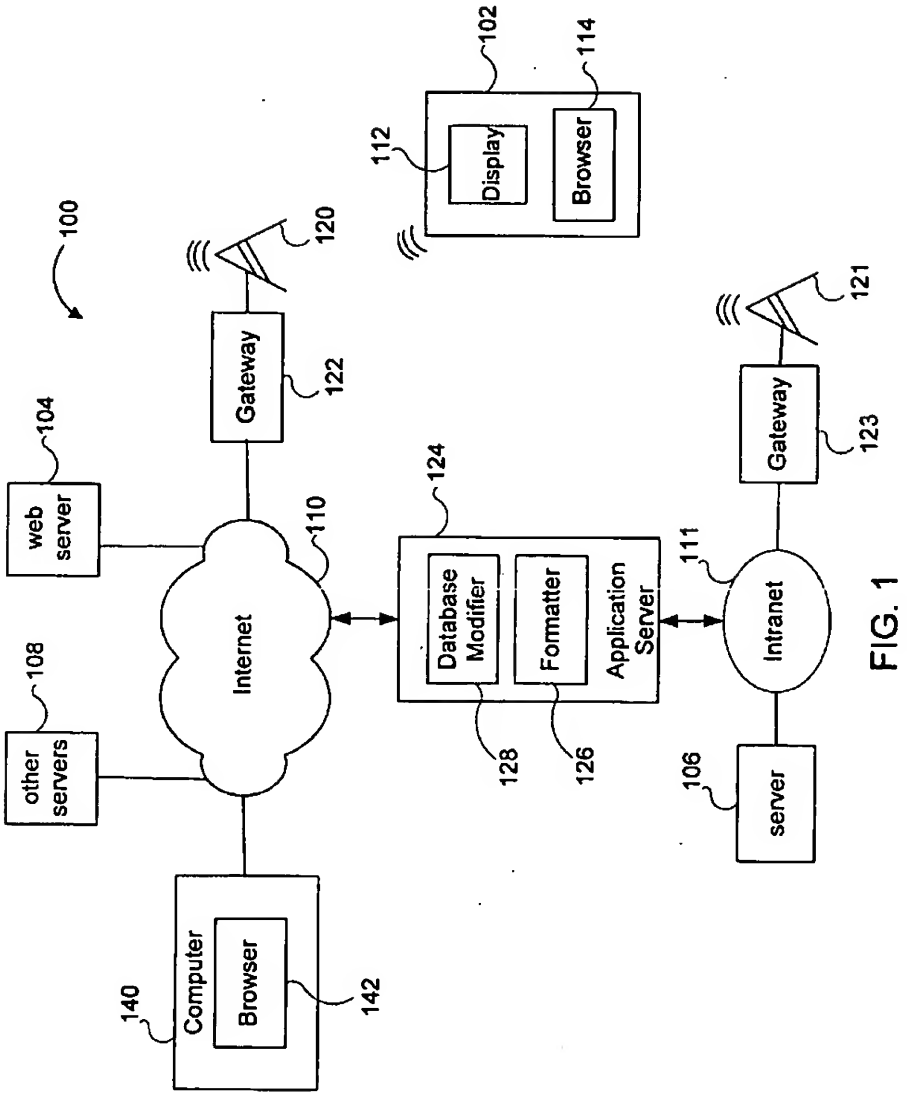

100
102
114
112
Display
Browser
120
121
Gateway
122
Gateway
123
104
web server
124
110
111
Database Modifier
Formatter
Application Server
Internet
Intranet
108
other servers
128
126
106
server
140
Computer
Browser
142

FIG. 1

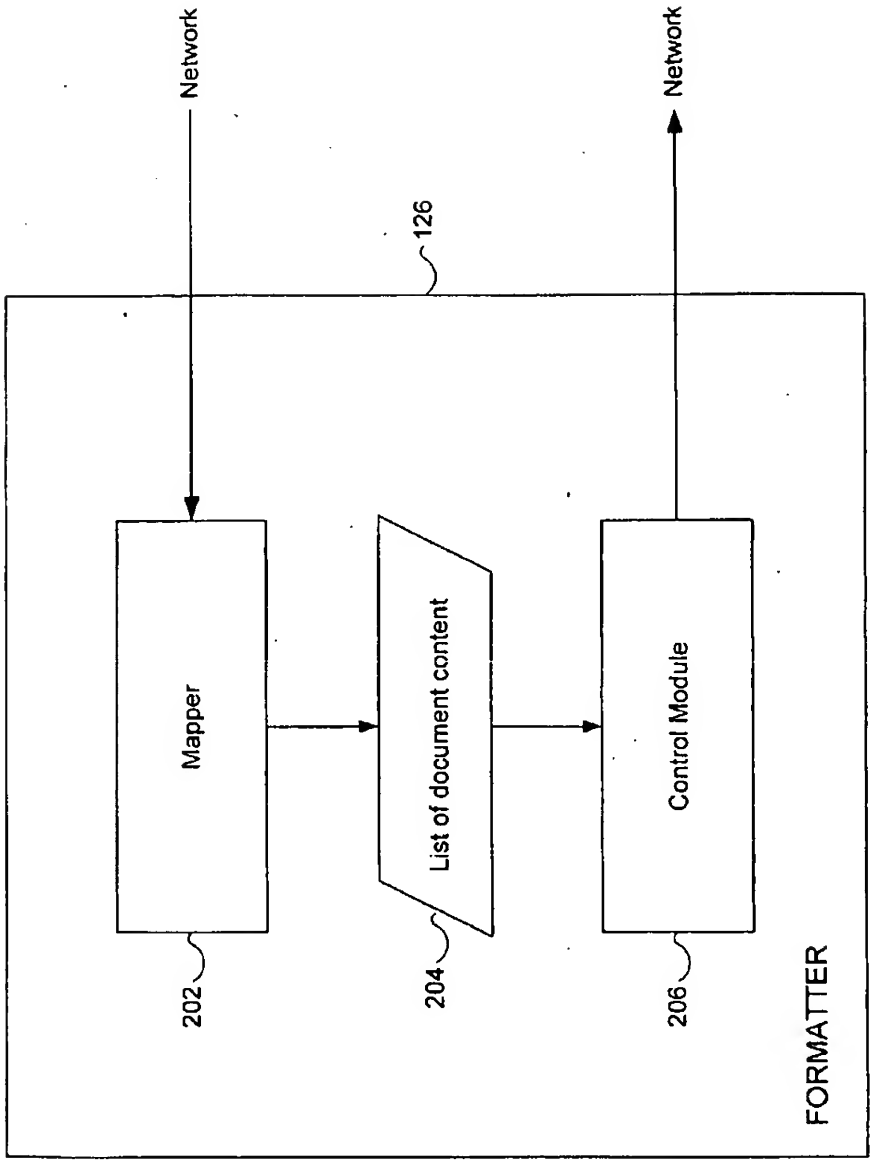

Network
Network
126
Mapper
List of document content
Control Module
202
204
206
FORMATTER

FIG. 2

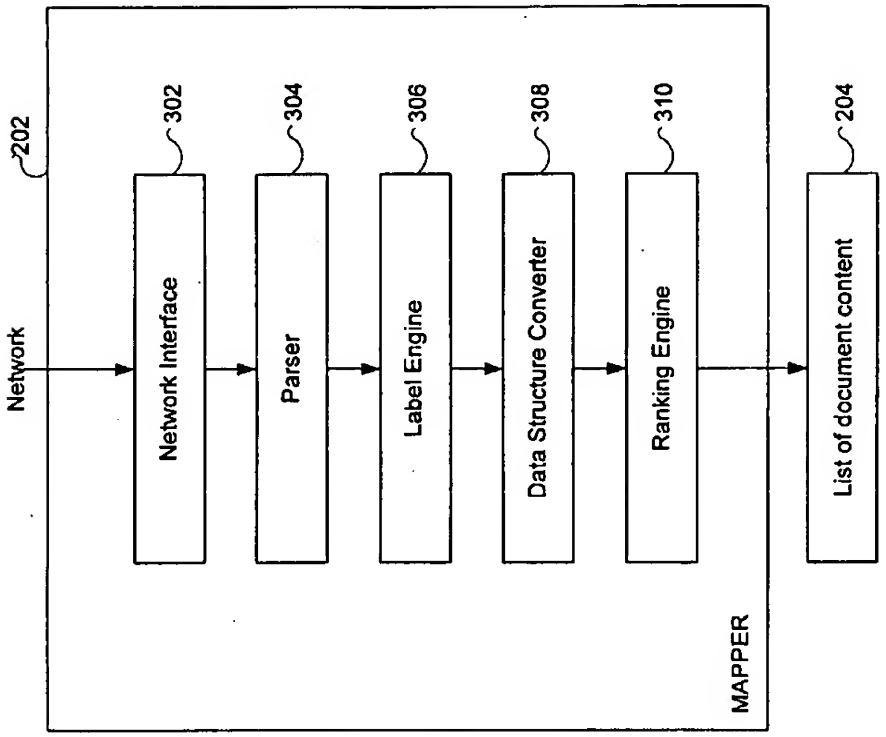

202
302
304
306
308
310
204
Network
Network Interface
Parser
Label Engine
Data Structure Converter
Ranking Engine
List of document content
MAPPER

FIG. 3

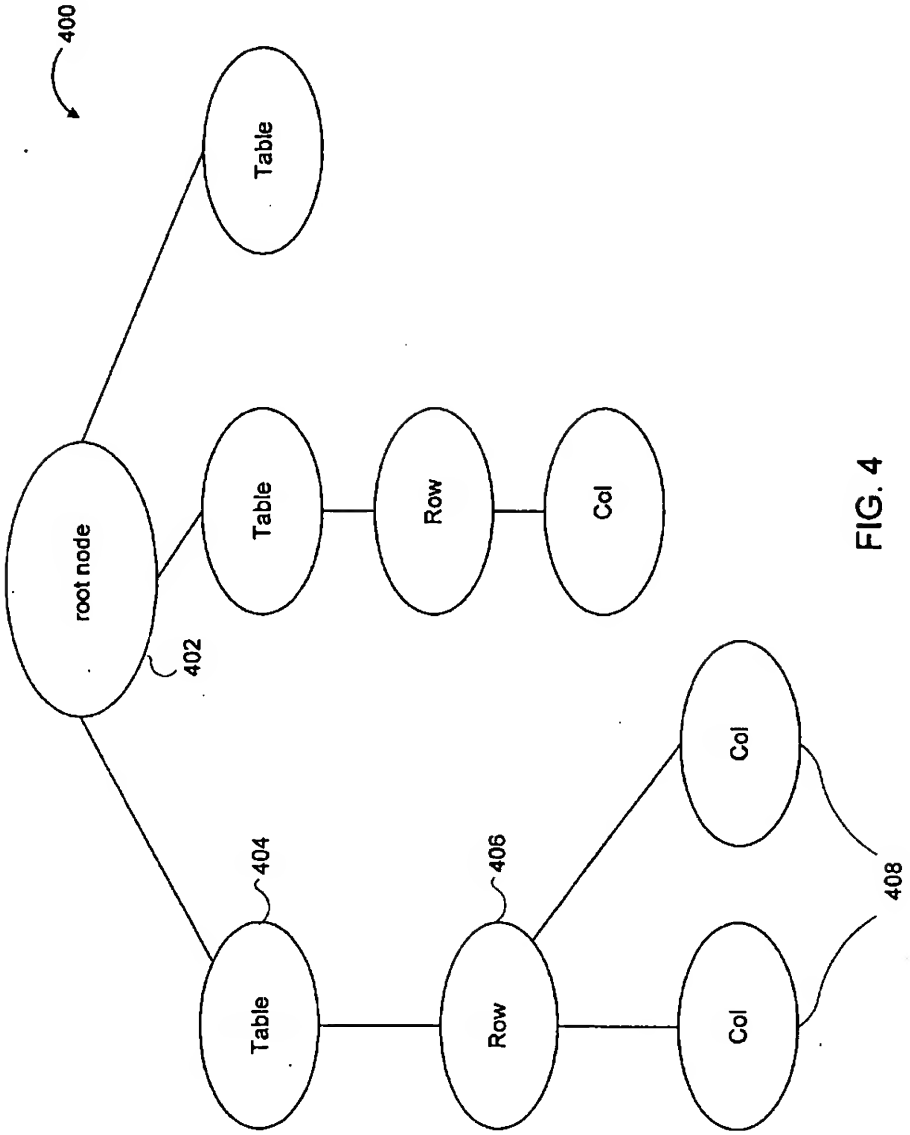

400
Table
root node
Table
Row
Col
402
Col
404
406
408
Table
Row
Col

FIG. 4

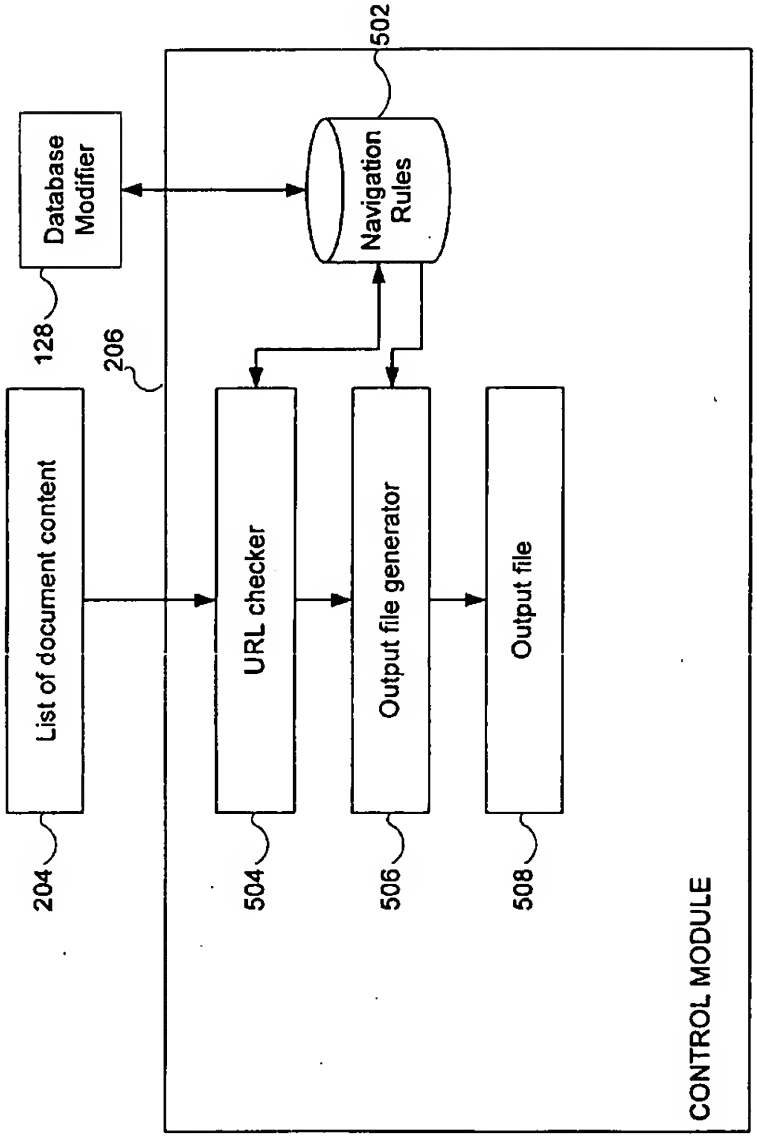

502
Database Modifier
Navigation Rules
128
206
List of document content
URL checker
Output file generator
Output file
204
504
506
508
CONTROL MODULE

FIG. 5

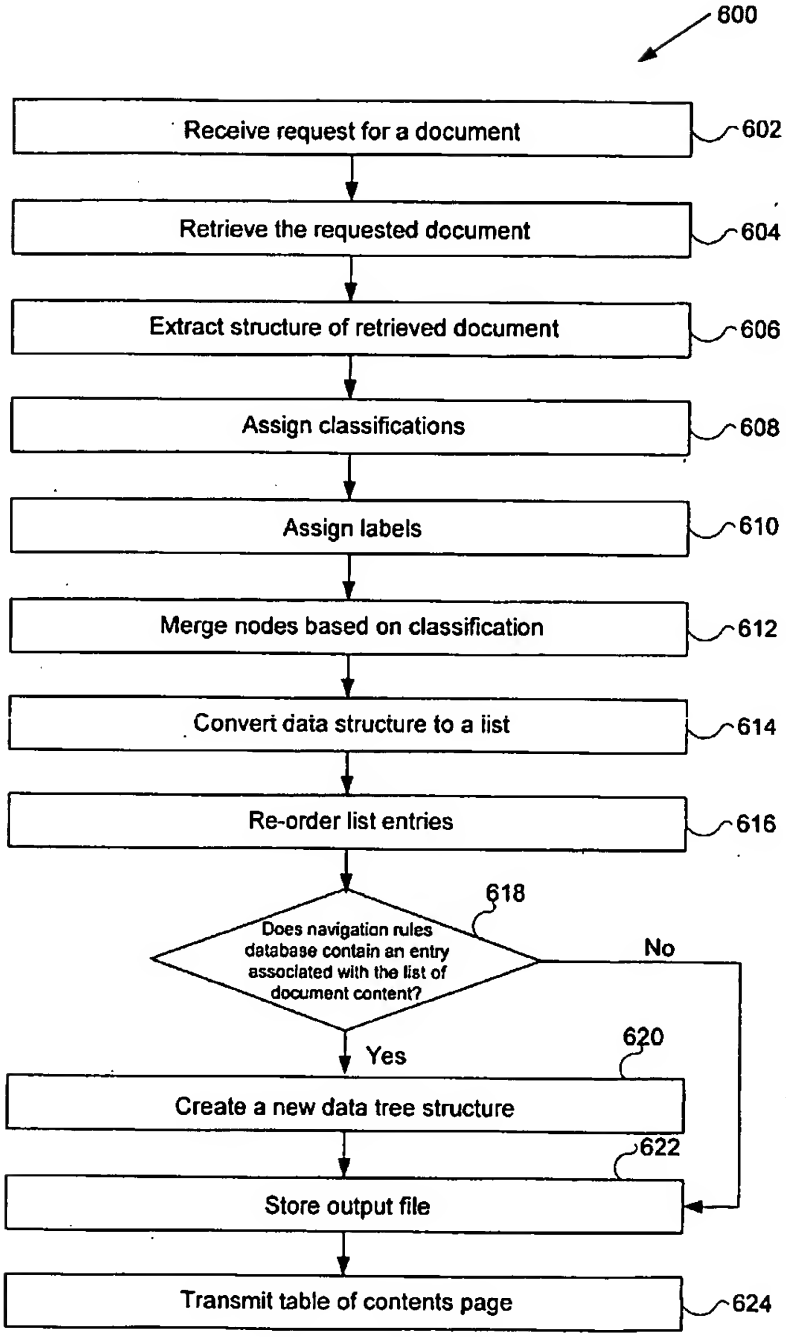

600
Receive request for a document
602
Retrieve the requested document
604
Extract structure of retrieved document
606
Assign classifications
608
Assign labels
610
Merge nodes based on classification
612
Convert data structure to a list
614
Re-order list entries
616
618
Does navigation rules database contain an entry associated with the list of document content?
No
Yes
620
Create a new data tree structure
622
Store output file
Transmit table of contents page
624

FIG. 6

SYSTEM AND METHOD FOR MODIFYING A DOCUMENT FORMAT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit and priority of U.S. Provisional Patent Application No. 60/269,498 entitled "Navigation Control Module" filed Feb. 16, 2001 and of U.S. Provisional Patent Application No. 60/284,354 entitled "Enhanced Navigation Control Module (ENCM)" filed Apr. 16, 2001, the disclosures of which are hereby incorporated by reference in their respective entireties.

CROSS REFERENCE TO ATTACHED COMPACT DISK APPENDIX

[0002] A Compact Disk Appendix, of which two identical copies are attached hereto forms a part of the present disclosure and is incorporated herein by reference in its entirety. The Compact Disk Appendix contains the following files: Automa~1.cpp, 41 KB, 02/13/2002; Automa~1.h, 2 KB, 02/13/2002; Classify.cpp, 15 KB, 02/13/2002; Classify.h, 1 KB, 02/13/2002; Handle~1.cpp, 25 KB, 02/13/2002; Handle~1.h, 4 KB, 02/13/2002; Ncmmgr.cpp, 8 KB, 02/13/2002; Ncmmgr.h, 1 KB, 02/13/2002; Url.cpp, 2 KB, 02/13/2002; and Url.h, 1 KB, 02/13/2002.

RESERVATION OF COPYRIGHT

[0003] A claim of copyright protection is made on portions of the description in this patent document, including the contents of the Compact Disk Appendix. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, exactly as it appears in the Patent and Trademark Office patent file or records, but reserves all other rights whatsoever.

TECHNICAL FIELD

[0004] The present invention relates to a system and method for modifying a document format.

BACKGROUND

[0005] Handheld devices, including Personal Digital Assistants (PDAs) and cellular telephones, offer connectivity to the Internet and permit access to documents available over the Internet. Wireless Application Protocol (WAP) is a standard for providing cellular phones, PDAs, pagers and other handheld devices with secure access to web pages. WAP features the Wireless Markup Language (WML), which generally serves as a universal medium for translating web-based HTML content into a format that accommodates small form factor displays and key sets found on conventional handheld devices. WML also allows handheld device manufacturers to include microbrowsers in their products that accept WML input from a WAP-based system across vast regions of the world.

[0006] A packet-based service called "i-Mode" provides information service for mobile telephones and permits users of mobile telephones to browse web content via a mobile telephone. In recent years, the number of users of the i-Mode standard has increased dramatically, perhaps most significantly in the United States and Japan.

[0007] The proliferation of wireless PDAs has also created a popular means for handheld Internet access. However, presenting IP-based content, and other content developed for display on large form factor devices (e.g., PC monitors), on small form factor screens of handheld devices has, in the past, been problematic. Two primary methods of presenting such content to handheld devices have been employed.

[0008] The first such method can be termed "fixed mapping." Fixed mapping typically involves rewriting an existing document, such as an HTML-based web page, to conform to a specific standard, such as WAP or i-Mode. A web server must then maintain the rewritten web site as a separate site with its own URL in addition to the original document. As new content is added to the original document, a web site operator must manually trim, edit, and condense the new content by rewriting the new content into a format that will accommodate the interface parameters of handheld devices. This method is limited in that considerable time and expense are typically required to maintain the two web sites in parallel. Further, the manual editing of the rewritten web site can be time-consuming, burdensome, and expensive.

[0009] The second method may be termed "transcoding." Transcoding typically involves the use of software that takes the entire content of a web site as input, converts the entire content into a format of a specific handheld wireless standard for transmission to handheld devices. The entire content, as formatted according to a handheld wireless standard, is then transmitted to the handheld device. This conversion may be performed "on-the-fly" (i.e., automatically in real time) or may be performed manually.

[0010] Transcoding has the advantage of reducing the investment to reach wireless markets since it leverages existing web sites. From a user standpoint, transcoding is desirable in that it preserves all the text-based information from the originating site. For large volumes of text, however, using this approach may overwhelm the handheld device user with large volumes of text to be viewed on a small form factor display. Further, the unorganized transcoded content makes changes or modifications to the wirelessly enabled web site more difficult for the web site operator.

[0011] In addition, many wireless handheld devices have limited bandwidth. For example, today, many wireless handheld devices have data rates in the range of about 9.6-64 kbs. Thus, downloading an entire web page designed for viewing on a large form factor device at data rates common to handheld wireless devices may require large download times. These large download times may be burdensome to the user who must wait while the entire web page downloads, even though the user may only desire to view a portion of the web page. Further, these large download times may be expensive for users who pay for wireless service based on the amount of time or the number of packets downloaded. For example, some i-Mode services charges are packet-based so downloading large pages cost more to download than smaller pages if the larger pages result in more data packets being sent to the user.

[0012] Additional background details are disclosed in U.S. Pat. No. 6,336,124, the disclosure of which is hereby incorporated by reference.

SUMMARY

[0013] Accordingly, a need exists to provide a system and method for presenting content developed for display on large form factor devices (e.g., PC monitors) on small form factor screens of handheld devices.

[0014] Pursuant to one embodiment of the present invention, a document having a first structure is divided into multiple blocks, or sub-documents. Content of the blocks is arranged in a list such that individual entries of the list include the content of associated blocks. A database is provided that includes a data structure associated with the document. The data structure stored in the database specifies a manner of displaying the list entries. Then, the entries of the list are inserted into the data structure to form an output file formatted in accordance with the data structure. Portions of the output file may then be transmitted over a network, such as the Internet, to a client device. The client device may comprise a PDA, a mobile telephone, a pager, or the like. Thus, according to this embodiment, regardless of the specific contents of the document, which may change from time to time, the document is reformatted pursuant to the associated data structure stored in the database.

[0015] According to another aspect, the database entry associated with a document may include labels associated with one or more of the entries of the list. The database entry associated with the document may also specify that certain of the entries of the list not be displayed at all at the client device. Further, the database entry associated with the document may specify an order in which various entries of the list are displayed at the handheld device.

[0016] In one embodiment, the database comprises an element of an application server and may be configured remotely over a network, such as the Internet or an intranet. For example, a user at a client personal computer may access the application server over the network using a web browser. Specifically, the user may specify, for a particular document, such as a web page, the manner in which the document will be displayed at a client handheld device by adding, or modifying, an entry in the database associated with the document.

[0017] The contents of the database may be configured, or modified, by different means. For example, if the application server were hosted on a personal network, the owner, or system administrator, of the personal network could configure the contents of the database from any client computer coupled to the personal network, such as via the Internet or an intranet. Alternatively, if the application server were hosted by a corporation, the contents of the database may be configured by the owner, or system administrator for the document for which the database is being modified.

[0018] In this regard, pursuant to an example embodiment of the present invention, the application server provides the user at the client personal computer with visual representation of the document with identifiable tags or labels. These visual tags or labels are provided to facilitate user modification of the underlying tree data structure of the document as formatted for a large form factor display. The user then modifies the tree data structure by, for example, deleting entries, moving entries, and changing labels assigned to various nodes of the data structure to form a modified data structure. This modified data structure is then later used by the application server to reformat the associated document for display at a small form factor display of a client.

[0019] Pursuant to another aspect of the present invention, the application server generates an output file associated with the document that includes a table of contents (TOC) and a set of sub-documents associated with the document. The table of contents comprises a page including the labels assigned to the various blocks of the document and the sub-documents comprise the content of associated blocks. Accordingly, in operation, when a small form factor client device requests a document from the application server, the application server returns the table of contents page, rather than all of the content of the entire document itself. The table of contents page includes links associated with entries in the table of contents page. These links comprise the addresses of associated sub-documents to permit the user to request a sub-document by selecting the associated, or corresponding, link.

[0020] Additional details regarding the present system and method may be understood by reference to the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] **FIG. 1** is a block diagram of a document delivery system in accordance with one embodiment of the present invention.

[0022] **FIG. 2** is a block diagram of the formatter of FIG.1 in accordance with one embodiment of the present invention.

[0023] **FIG. 3** is a block diagram of the mapper of **FIG. 2** in accordance with one embodiment of the present invention.

[0024] **FIG. 4** illustrates a tree data structure in accordance with one embodiment of the present invention.

[0025] **FIG. 5** is a block diagram of the control module of **FIG. 2** in accordance with one embodiment of the present invention.

[0026] **FIG. 6** is a flowchart illustrating a method in accordance with one embodiment of the present invention.

[0027] Common reference numerals are used throughout the drawings and detailed description to indicate like elements.

DETAILED DESCRIPTION

[0028] FIG.1 illustrates a document delivery system **100** in accordance with one embodiment of the present invention. The document delivery system **100** permits a client **102** to access content of documents (not shown) stored at server **104**, server **106**, or other servers **108** over a network **110**, such as the Internet, and over a network **111**, such as an intranet.

[0029] In one embodiment, the client **102** comprises a handheld device, such a PDA (Personal Digital Assistant), a mobile telephone, or the like, having a small form factor display **112**. The client **102** also includes a web browser **114**. The web browser **114** may comprise a microbrowser

designed for small display screens on web-enabled cellular telephones, PDAs and other handheld devices, including wireless handheld devices.

[0030] The client **102** may exchange data with the network **110** in a wireless fashion via a wireless station **120** and a gateway **122** in accordance with WAP (Wireless Application Protocol), i-Mode, or other suitable protocol or service. Optionally, the client **102** may exchange data with the network **110** via a wired connection (not shown).

[0031] The client **102** may also exchange data with the network **111** in a wireless fashion via a wireless station **121** and a gateway **123** in accordance with WAP (Wireless Application Protocol), i-Mode, or other suitable protocol or service. Optionally, the client **102** may exchange data with the network **111** via a wired connection (not shown).

[0032] In one embodiment, the gateways **122, 123** are network devices that connect a wireless network with a wired network, such as the networks **110, 111**. Access between the client **102** and application server **124** may also pass through one or more other firewalls (not shown), other gateway devices (not shown), or the like.

[0033] Pursuant to one embodiment, the client **102** transmits requests for documents stored on one or more of the servers **104, 106, 108** to the application server **124**. The request for content may comprise an HTTP request or other suitable type of request. Moreover, the application server **124** may alternatively receive the request for a document from the client **102** from any network (e.g., **110, 111**). The application server **124**, among other functionality, functions as a proxy server and receives requests for documents from client devices, such as the client **102**, over the networks **110, 111** and provides associated content in response to such requests by transmitting the associated content over at least one of the networks **110, 111**.

[0034] In response to a request for a document from the client **102**, the application server **124** requests the document identified by the request from one or more of the servers **104, 106, 108**. Upon receipt of the document identified by the request, the application server **124** modifies the format of the document identified by the request for content using a formatter **126**.

[0035] In one embodiment, the document identified by the request is an HTML or XML web page, although other document types, such as PDF (Portable Document Format), may also be requested. The application server **124** then transmits at least a portion of the reformatted content of the document identified by the request to the client **102** in a format compatible with the browser **114** for display at the display **112** of the client **102**.

[0036] The formatter **126** includes a database (see, **FIG. 5**) that may be configured from a client admin computer **140** via a database modifier **128**. The database modifier **128** may comprise a JavaScript module that penn its a user at the client admin computer to visually modify a data structure of a document into a desired format. The modification may be performed by, for example, adding labels, re-ordering, moving, deleting, or otherwise changing portions of the data structure and stores the changed, or modified version of the data structure in the database.

[0037] In particular, the client admin computer **140** includes a web browser **142**, Such as Internet Explorer™ by Microsoft Corporation or other suitable web browser for permitting a user at the client admin computer **140** to view pages at a the database modifier **128** hosted at the application server **124**. The pages at the database modifier **128** of the application server **124** permit user configuration of the **FIG. 5** database, as discussed in more detail below.

[0038] In general, the formatter **126** receives the document identified by the request from one of the servers **104, 106, 108**, divides the document into multiple blocks, and assigns labels to individual blocks. The formatter **126** then generates a list containing the content of the various blocks. The formatter **126** then uses a data structure associated with the document and stored at the application server **124** to generate an output file using the generated list of content. The output file may contain a Table of Contents (TOC) page and sub-documents. The TOC page lists labels associated with the sub-documents and may contain links to the sub-documents. The formatter **126** then transmits the TOC page, a headline, an image, or other content specified by a database at the application server **124** to the client **102** over at least one of the networks **110, 111**. Details of the operation of the formatter **126** are discussed in more detail below.

[0039] **FIG. 2** illustrates details of the formatter **126** of FIG.1 according to one embodiment of the invention. As shown, the formatter **126** includes a mapper **202**, and a control module **206**, which may comprise software written in C++ or other suitable programming language. The mapper **202** receives the requested document and reformats the document as a list of document content **204**. The control module **206** then generates an output file using the list document content **204**. Additional details regarding the mapper **202**, the list of document content **204**, and the control module **206** are discussed below.

[0040] **FIG. 3** illustrates details of the mapper **202** of **FIG. 2** according to one embodiment of the invention. The mapper **202** includes a number of software modules stored in a computer readable medium. In particular, the mapper **202** includes a network interface **302**, a parser **304**, a label engine **306**, a data structure converter **308**, and a ranking engine **310**. The network interface **302** receives the document requested from the network. As mentioned above, the document requested may comprise a web page, such as an HTML document, and XML document, or the like.

[0041] The parser **304** parses and decomposes the document into a tree data structure. **FIG. 4** illustrates an example tree data structure **400**, which may comprise a structural representation of a document, such as an HTML web page. As shown, the tree data structure **400** includes a root node **402** associated with the document. The parser **304** (**FIG. 3**) divides the document into multiple blocks and represents each block of the document as a table node **404** in the tree data structure **400**. Each table node **404** has at least one row node **406** as a child node. Individual row nodes **406** each have at least one column node **408** as a child node. The column nodes **408** may then have additional table nodes as children. At this point, the tree data structure **400** may be recursive.

[0042] Thus, the document is divided into blocks, which may be defined by the structure of the document. The primary content for each of the blocks, or tables, is stored in the column nodes **408** and the remaining structure of the various blocks is represented in the other portions of the tree data structure **400**.

[0043] Referring again to **FIG. 3**, the label engine **306** then assigns labels to individual blocks and may assign a classification to each block according to the contents of the block. In one embodiment, the label engine **306** assigns a classification to each block based on the block contents. For example, if the document is a web page, the web page may include links, text, forms, and pictures, as well as other classes of content.

[0044] The label engine **306** optionally analyzes individual blocks and assigns a classification to the block indicating the type, or class, of content in the block. Hence, a block that contains primarily links may be assigned a "navigation" classification, a block that contains primarily text may be assigned a "story" classification, a block that contains primarily pictures may be assigned an "image" classification, and a block that contains form information like an address may be assigned a "form" classification. The label engine **306** inserts a classifier associated with the assigned classification for each block into the table node of each block.

[0045] After classifying the blocks, the label engine **306** optionally merges, or combines, column nodes of each block that have the same classification. For example, if a given block has multiple column nodes having the classification of "story," the label engine **306** would merge, or combine, the content of these column nodes. Likewise, if a given block has multiple columns having the classification of "navigation," the label engine **306** would merge, or combine, the content of these column nodes.

[0046] In one embodiment, the label engine **306** may merge, or combine, column nodes in accordance with predetermined merging rules stored at the label engine **306**. An example merging rule is that a large "story" node is not merged with another large "story" node. Another example merging rule is that a small "story" node may get merged with a "navigation" node. Thus, according to these rules, a large story, which is likely to be substantial enough to be viewed in isolation, will not be combined with another large story. However, a small story would not be isolated as a data packet associated with the small story may be able to contain additional information, such as one or more links. The specifics of these merging rules may vary and may be customized according to particular applications. The classifying and merging are optional according to some embodiments of the invention.

[0047] The label engine **306** also assigns a label to each block according to the block contents. In one embodiment, the label engine **306** uses the first several words of text of a block including text as the label for that block. In another embodiment, the label engine **306** assigns a label to a block based on the classification of the block. The label engine **306** then adds the assigned label to the table node of the associated block.

[0048] With continued reference to **FIG. 3**, a data structure converter **308** of the mapper **202** next "flattens" the tree data structure by converting the tree data structure into a linear, one-dimensional list containing the content of the column nodes **408**. The table nodes **404** and the row nodes **406** are not included in the one-dimensional list. Individual entries in the one-dimensional list include the content of an associated column nodes **408**.

[0049] A ranking engine **310** then ranks the entries in the one-dimensional list according to the content of the individual entries. In one embodiment, the ranking engine **310** analyzes characteristics of each entry and assigns a "weight" value to each entry. The weight assigned to each entry may be based on a variety of parameters, including, for example, the size of the font used in the entry, whether the text in the entry is boldface, the color of the text, whether the text is flashing, whether the text is underlined, and the position of the item in the document. Based on parameters such as these, the ranking engine **310** assigns a weight to individual entries in the one-dimensional list and then reorders the one-dimensional list according to the weighted rankings.

[0050] In one embodiment, the ranking engine **310** reorders the list in an order of decreasing weight values such that the first entry in the re-ordered list is the entry having the largest weight value and the last entry in the list the entry having the smallest weight value. The re-ordered list is then stored as the list of document content **204** (**FIG. 2**). Thus, in some embodiments, entries having large or bold text may be ranked before entries having smaller or plain text. Also, entries having a graphic may be ranked higher than entries having primarily links.

[0051] **FIG. 5** illustrates details of the control module **206** of **FIG. 2** in accordance with one embodiment of the present invention. In general, the control module **206** receives the list of document content **204** and creates a new document structure according a navigation rules database **502** and the list of document content **204**.

[0052] The navigation rules database **502** contains a tree data structure for one or more documents. In one embodiment, contents of the navigation rules database **502** may be modified by accessing the formatter **126** (**FIG. 1**) from a client computer, such as the client admin computer **140** (**FIG. 1**). The database modifier **128** may modify the contents of the navigation rules database **502** described above.

[0053] In particular, the client admin computer **140** includes browser **142** and permits a user to access the database modifier **128** and to modify the contents of the navigation rules database **502**. To modify the contents of the navigation rules database **502**, a user at the client admin computer **140** directs the browser **142** to the database modifier **128**. The database modifier **128** then presents the user with a GUI (Graphical User Interface) via the browser **142** that permits the user to view a default tree data structure, as constructed by the mapper **202**, for a given document, such as an HTML or XML web page document. The default tree structure may be the structure of the document at issue as determined by parsing the document.

[0054] The user may then delete entries in the tree data structure. The user may alternatively move tree data structure entries from one location to another within the tree data structure. Further, the user may change the label or classification assigned to given nodes within the tree data structure. After the user has thus modified, or customized, the tree data structure, the control module **206** stores the modified tree data structure as an entry in the navigation rules database **502** associated with the document.

[0055] The control module **206** also includes a URL (Uniform Resource Locator) checker **504**. The URL checker **504** receives the list of document content **204** from the mapper **302** and determines whether the navigation rules database **502** includes a tree data structure associated with

the list of document content **204**. In one embodiment, the URL checker determines whether the URL associated with the list of document content **204** matches a URL associated with an entry in the navigation rules database **502**. If such a match exists, an output file generator **506** retrieves the tree data structure in the navigation rules database **502** associated with the list of document content **204**. The output file generator **506** then creates an output file **508** based on the retrieved tree data structure using the content of list of document content **204**.

[0056] The output file **508**, in one embodiment, includes a table of contents (TOC) page that lists the labels of the document. The output file **508** also contains one or more sub-documents. Individual sub-pages are associated with individual entries in the TOC. One or more of the labels, or entries, of the TOC may include links to associated sub-documents.

[0057] If the URL checker **504** determines that the navigation rules database **502** does not include a tree data structure associated with the list of document content **204**, then the output file generator **506** generates an output file **508** that includes a TOC page that lists the labels of the document. One or more of the labels, or entries, of the TOC may include links to associated sub-documents.

[0058] The formatter **126** then transmits the TOC page over at least one of the networks **110, 111** to the client **102**. Upon receipt of the TOC page at the client **102**, the client **102** displays the TOC page at the display **112** of the client **102**. The user may then select a link associated with one of the entries of the TOC, which requests an associated sub-document from the output file **508**. In response to a request for a sub-document in the output file **508**, the formatter transmits the requested sub-document to the client **102** over at least one of the networks **110, 111** for display at the display **112** of the client **102**.

[0059] **FIG. 6** illustrates a flowchart **600**, which depicts a method according to one embodiment of the present invention. The method commences at block **602** where application server **124** receives a request for document from the client **102 (FIG. 1)**, the requested document residing on at least one of the servers **104, 106, 108**. The request for document may be directed to the application server **124** directly. Alternatively, the request for document may be directed directly to one of the servers **104, 106, 108**, which, in turn, redirects the request for document to the application server **124**. The request for document may comprise an HTTP request or other suitable request. Moreover, the requested document may comprise a document in HTML, XML, PDF, or other suitable format.

[0060] Next, at block **604**, the application server **124** retrieves the requested document from one or more of the servers **104, 106, 108** on which the document resides. This retrieval may be accomplished by the application server **124** transmitting an HTTP request to the server **104, 106, 108** at which the requested document is stored. For example, if the requested document resides at the server **104**, the application server **124** requests the document from the server **104** over the network **110** and receives the requested document over the network **110**.

[0061] Then, at block **606**, the formatter **126** of the application server **124** extracts a structure of the retrieved document. In one embodiment, a parser **304 (FIG. 3)** parses the retrieved document and generates a tree data structure representing the structure of the retrieved document. An example of such a tree data structure is illustrated in **FIG. 4** and is described above.

[0062] For individual nodes of the tree data structure that include document content, the formatter **126** next analyzes the content of the nodes and assigns one of a set of predefined classifiers to each of the nodes based on the content of the nodes, pursuant to block **608**. As discussed above, for a node having content comprising primarily text, the label engine **306** of the formatter **126** may assign a "story" classifier to the node. The classifier may comprise a text string or other identifier added to the node.

[0063] At block **610**, the label engine **306** of the formatter **126** assigns labels to individual nodes of the tree data structure that include document content. The label engine **306** may assign a label based on the content of the node, the assigned classification of the node, or both. In one embodiment, the label engine **306** uses the first several words of nodes having text content as the label for the associated node. The label may indicate the content of the node being labeled.

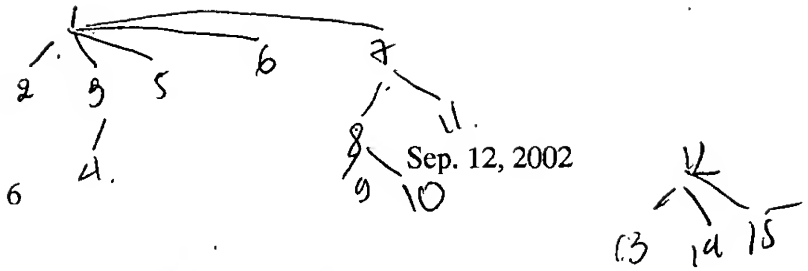
[0064] At block **612**, the label engine **306** merges nodes having content according to their classification. For example, if a pair of nodes having content both have the classification "navigation," then the label engine **306** merges the content of these nodes to form a single node that includes the content of the merged nodes. Block **612** may alternatively be performed before block **610**.

[0065] At block **614**, the data structure converter **308** of the mapper **202** converts the tree data structure to a list. The data structure converter **308** extracts the nodes of the tree data structure that include content and generates a list comprising the nodes of the tree data structure that include content, without the other associated nodes, such as table and row nodes, which do not include content.

[0066] Next, at block **616**, the ranking engine **310 (FIG. 3)** of the mapper **202** reorders the entries of the list generated at block **614**. In one embodiment, the ranking engine **310** assigns a weight value to each of the entries in the list according to certain parameters of the content of the entries, the classification of the list entry, or a combination thereof. Then, the ranking engine **310** reorders the list according to the weight value of the list entries. For example, the ranking engine **310** may order the list entries in order of decreasing weight value. The ranking engine **310** then stores the re-ordered list as the list of document content **204 (FIG. 2)**.

[0067] The control module **206 (FIG. 5)** then determines whether the navigation rules database **520** includes an entry associated with the list of document content **204**, pursuant to block **618**. In one embodiment, the URL checker **504** of the control module **206** determines whether a URL associated with the list of document content **204** matches a URL associated with an entry in the navigation rules database **502**. The URL checker **504** determines that the navigation rules database **502** contains an entry associated with the list of document content if such a match exists and execution proceeds to block **620**, else execution proceeds to block **622**.

[0068] At block **620**, the output file generator **506** creates a new data tree structure according using the list of docu-



ment content **204** and the associated entry of the navigation rules database **502**. The entry of the navigation rules database **502** may specify labels to be assigned to the various nodes, the location of the various nodes within the new data tree structure, and whether certain nodes are included in the new data tree structure. The output file generator **506** then creates a new data tree structure according to the entry in the navigation rules database **502** and inserts the associated content from the list of document content **204** to form a new data tree, which may be stored as the output file **508**.

[0069] At block **622**, the output file generator **506** stores the new data tree structure as the output file **508** if the navigation rules database **502** contains as entry associated with the list of document content **204**. Otherwise, the output file generator **506** stores the list of document content as the output file **508**.

[0070] The output file **508** includes a table of contents (TOC) page that lists the labels of the nodes having content and sub-documents that include the content of blocks associated with the labels. Each of the sub-documents is associated with one of the links so that a user at the client **102** may request a sub-document by selecting the link associated therewith.

[0071] Lastly, pursuant to block **624**, the formatter **126** transmits the TOC page to the client **102**.

[0072] The above-described embodiments of the present invention are meant to be merely illustrative and not limiting. Thus, those skilled in the art will appreciate that various changes and modifications may be made without departing from this invention in its broader aspects. Therefore, the appended claims encompass such changes and modifications as fall within the scope of this invention.

What is claimed is:

1. A method for converting a document from a first format to a second format, the method comprising:

dividing a document having a first structure into blocks;

creating a list having entries, individual entries of the list containing content of associated ones of the blocks;

providing a database including a data structure associated with the document, the data structure specifying a manner of displaying at least one of the entries;

inserting entries of the list into the data structure to form an output file.

2. The method for converting a document from a first format to a second format according to claim 1, further comprising transmitting at least a portion of the output file over a network to a client device.

3. The method for converting a document from a first format to a second format according to claim 1 wherein the creating a list further comprises assigning a classification to individual list entries.

4. The method for converting a document from a first format to a second format according to claim 3, further comprising merging list entries having the same classification.

5. The method for converting a document from a first format to a second format according to claim 1 wherein the creating a list further comprises re-ordering the list according to the content of individual list entries.

6. The method for converting a document from a first format to a second format according to claim 1 wherein the output file contains sub-documents and a table of contents page listing the labels, wherein individual sub-documents are associated with individual labels.

7. The method for converting a document from a first format to a second format according to claim 1, further comprising:

extracting a structure of the document to form an extracted data structure associated with the document;

modifying the extracted data structure;

storing the modified extracted data structure as the data structure.

8. The method for converting a document from a first format to a second format according to claim 7, wherein the modifying the extracted data structure further comprises adding labels to the extracted data structure.

9. The method for converting a document from a first format to a second format according to claim 8, wherein the modifying the extracted data structure further comprises removing a portion of the extracted data structure.

10. The method for converting a document from a first format to a second format according to claim 8, wherein the modifying the extracted data structure further comprises removing a portion of the extracted data structure from a first location within the extracted data structure and adding the portion of the extracted data structure at a second location within the extracted data structure.

11. The method of converting a document from a first format to a second format according to claim 7, wherein the document comprises an HTML document, an XML document, or a PDF document.

12. A method for converting a document from a first format to a second format, the method comprising:

extracting a structure of a first document to form a first data structure;

modifying the first data structure to form a second data structure;

extracting content of a second document;

inserting the content of the second document into the second data structure, the content of the second document being different from content of the first document.

13. The method for converting a document from a first format to a second format according to claim 12, wherein the modifying the first data structure further comprises deleting a portion of the first data structure.

14. The method for converting a document from a first format to a second format according to claim 12, wherein the modifying the first data structure further comprises adding a label to a portion of the first data structure.

15. The method for converting a document from a first format to a second format according to claim 12, wherein the first and second documents are web pages.

16. A method for converting a document from a first format to a second format, the method comprising:

extracting a first data structure from a first document, content of the first document being stored in nodes of the data structure;

assigning a label to the nodes of the first data structure that store the content of the document based on the content stored in the nodes;

generating a one-dimensional list of the nodes that include the content of the document.

17. The method for converting a document from a first format to a second format according to claim 16,

providing a database including a second data structure associated with the first document, the second data structure specifying a manner of displaying at least one of the entries;

inserting entries of the list into the data structure to form an output file.

18. The method for converting a document from a first format to a second format according to claim 17, wherein the providing a database further comprises:

extracting a structure of a second document to form a second data structure, the second document having a same structure as the first document;

modifying the second data structure to form a third data structure;

storing the third data structure in a database.

19. The method for converting a document from a first format to a second format according to claim 18, wherein the modifying further comprises removing at least one portion of the second data structure.

20. The method for converting a document from a first format to a second format according to claim 18, wherein the modifying further comprises moving at least one portion of the second data structure from a first location within the second data structure to a second location within the data structure.

21. A computer readable medium comprising program instructions for:

dividing a document having a first structure into blocks;

creating a list having entries, individual entries of the list containing content of associated ones of the blocks;

providing a database including a data structure associated with the document, the data structure specifying a manner of displaying at least one of the entries;

inserting entries of the list into the data structure to form an output file.

22. A computer readable medium comprising program instructions for:

extracting a structure of a first document to form a first data structure;

modifying the first data structure to form a second data structure;

extracting content of a second document;

inserting the content of the second document into the second data structure, the content of the second document being different from content of the first document.

23. A computer readable medium comprising program instructions for:

extracting a first data structure from a first document, content of the first document being stored in nodes of the data structure;

assigning a label to the nodes of the first data structure that store the content of the document based on the content stored in the nodes;

generating a one-dimensional list of the nodes that include the content of the document.

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